UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Verjetnostne metode v računalništvu
Course title:	Probabilistic methods in computer science

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Interdisciplinarni magistrski študijski program Računalništvo in matematika	ni smeri	1 ali 2	prvi ali drugi
Interdisciplinary Masters study programme Computer Science and Mathematics	none	1 or 2	first or second

Vrsta predmeta / Course type	izbirni

Univerzitetna koda predmeta / University course code: M2840

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Klinične vaje** **work**	**Druge oblike študija**	**Samost. delo** **Individ. work**	**ECTS**
30	15	30			105	6

Nosilec predmeta / Lecturer: prof. Sergio Cabello Justo

Jeziki / **Languages:**	**Predavanja /** **Lectures:**	slovenski/Slovene, angleški/English
	Vaje / Tutorial:	slovenski/Slovene, angleški/English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Vsebina:	**Content (Syllabus outline):**

Quicksort in minimalni prerez.	Quicksort and minimum cut.
Razredi problemov in vrste naključnostnih algoritmov.	Classes of problems and types of randomized algorithms.
Uporaba polinomov.	Use of polynomials.
Černove meje.	Chernoff bounds.
Naključnostni prirastni algoritmi in povratna analiza.	Randomized incremental constructions and backwards analysis.
Linearno programiranje v nižjih dimenzijah.	Linear programming in low dimensions.
Markovske verige.	Markov chains.
Približno štetje.	Approximate counting.
Podlinearni algoritmi.	Sublinear algorithms.
Verjetnostna metoda.	Probabilistic method.

Temeljni literatura in viri / Readings:

M. Mitzenmacher in E. Upfal. Probability and Computing. Cambridge University Press, 2005.

R. Motwani, P. Raghavan. Randomized Algorithms. Cambridge University Press, Cambridge, 1995.

M. de Berg, O. Cheong, M. van Kreveld, M. Overmars. Computational Geometry: Algorithms and Applications. 3. izdaja, Springer, 2008.

J. Kleinberg in É. Tardos. Algorithm Design. Addison-Wesley, 2005.

Cilji in kompetence:	**Objectives and competences:**
Študent spozna uporabo verjetnosti za algoritmične in sorodne probleme.	Student gets acquainted with the use of probability for algoritmic and related problems.

Predvideni študijski rezultati:	**Intended learning outcomes:**

Osnovni naključnostni algoritmi. Naključnostni algoritmi v računski geometriji. Uporaba verjetnosti za analiziranje časovne zahtevnosti algoritmov. Uporaba verjetnosti za dokazovanje obstoja objektov.	Basic randomized algorithms. Randomized algorithms in computational geometry. Using probability to analize the running time of algorithms. Use of probability to show existance of objects.

Metode poučevanja in učenja: / **Learning and teaching methods:**

Predavanja, seminar, vaje, domače naloge, konzultacije, in samostojno delo študentov.	Lectures, seminar, exercises, homework, consultations, and independent work by the students.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Izpit iz vaj (2 kolokvija ali pisni izpit) ali domače naloge ustni izpit		Exercise-based exam (2 midterm exams or written exam) or homework Oral exam
Ocene: 6-10 pozitivno, 5 negativno (v skladu s Statutom UL)	50% 50%	Grading: 6-10 pass, 5 fail (according to the rules of University of Ljubljana)

Reference nosilca / Lecturer's references:

CABELLO, Sergio, ROTE, Günter. Obnoxious centers in graphs. SIAM journal on discrete mathematics, ISSN 0895-4801, 2010, vol. 24, no. 4, str. 1713-1730. [COBISS.SI-ID 15762265]

BERG, Mark de, CABELLO, Sergio, HAR-PELED, Sariel. Covering many or few points with unit disks. Theory of computing systems, ISSN 1432-4350, 2009, vol. 45, no. 3, str. 446-469. [COBISS.SI-ID 14900825]

CABELLO, Sergio, FORT, Marta, SELLARÈS, J. Antoni. Higher-order Voronoi diagrams on triangulated surfaces. Information processing letters, ISSN 0020-0190. [Print ed.], 2009, vol. 109,

iss. 9, str. 440-445. [COBISS.SI-ID 15160153]